

Superconducting RF Technology

-

The View from 10,000 ft

Warren Funk

**Director, Institute for
Superconducting RF Science & Technology
Jefferson Lab**



Thomas Jefferson National Accelerator Facility

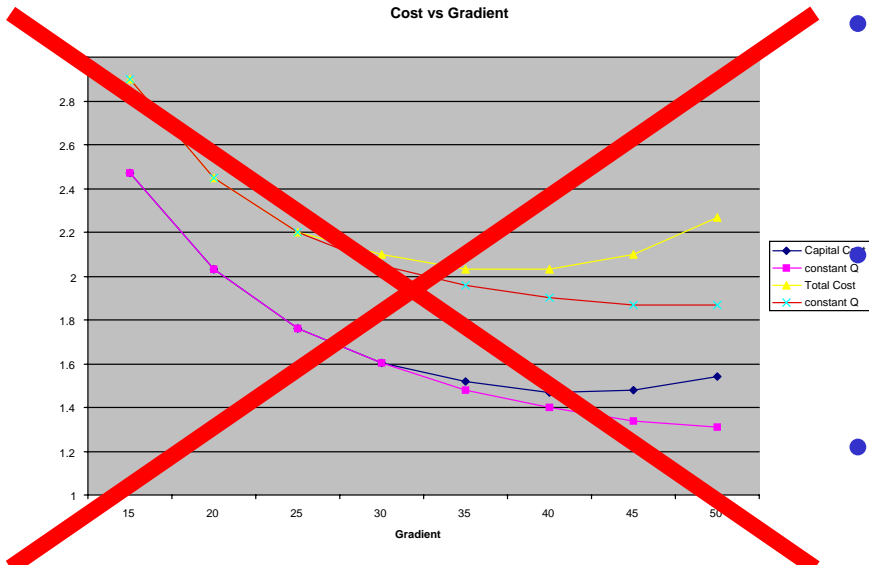
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Motivation

- Recently produced superconducting modules have cost ~\$450k per active meter at operating gradients of 15 – 20 MV/m
- Estimates for the linear collider assume costs ~\$75k/m for twice the performance!



- Frequently quoted cost models assume cavity/module unit costs are independent of gradient!

Combination of economies of scale and learning curves could buy us a factor of two

- We need at least another two factors of two!

We need a new paradigm! New designs! New methods!
Our goal: an international partnership of national labs, universities and industries executing a coherent, integrated development program.



SRF Technology is Deployed Worldwide

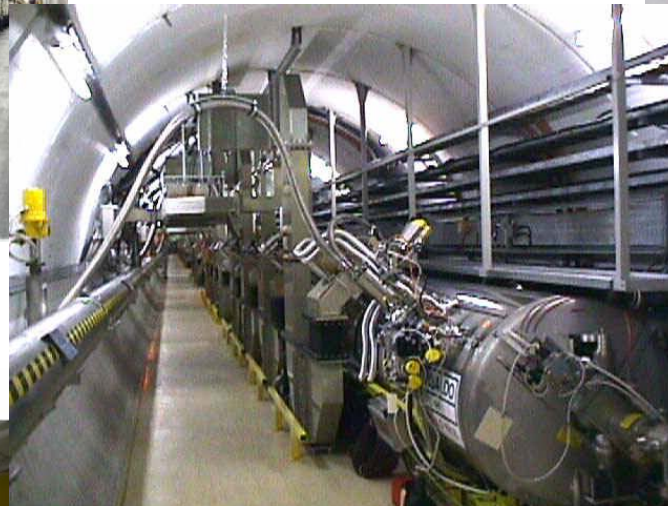


USA: SNS at ORNL
CEBAF at JLab



800 MeV

400 MeV



Europe: LEP at CERN*
TTF at DESY

* No longer in service



Japan: TRISTAN at KEK*

Carlo Pagani



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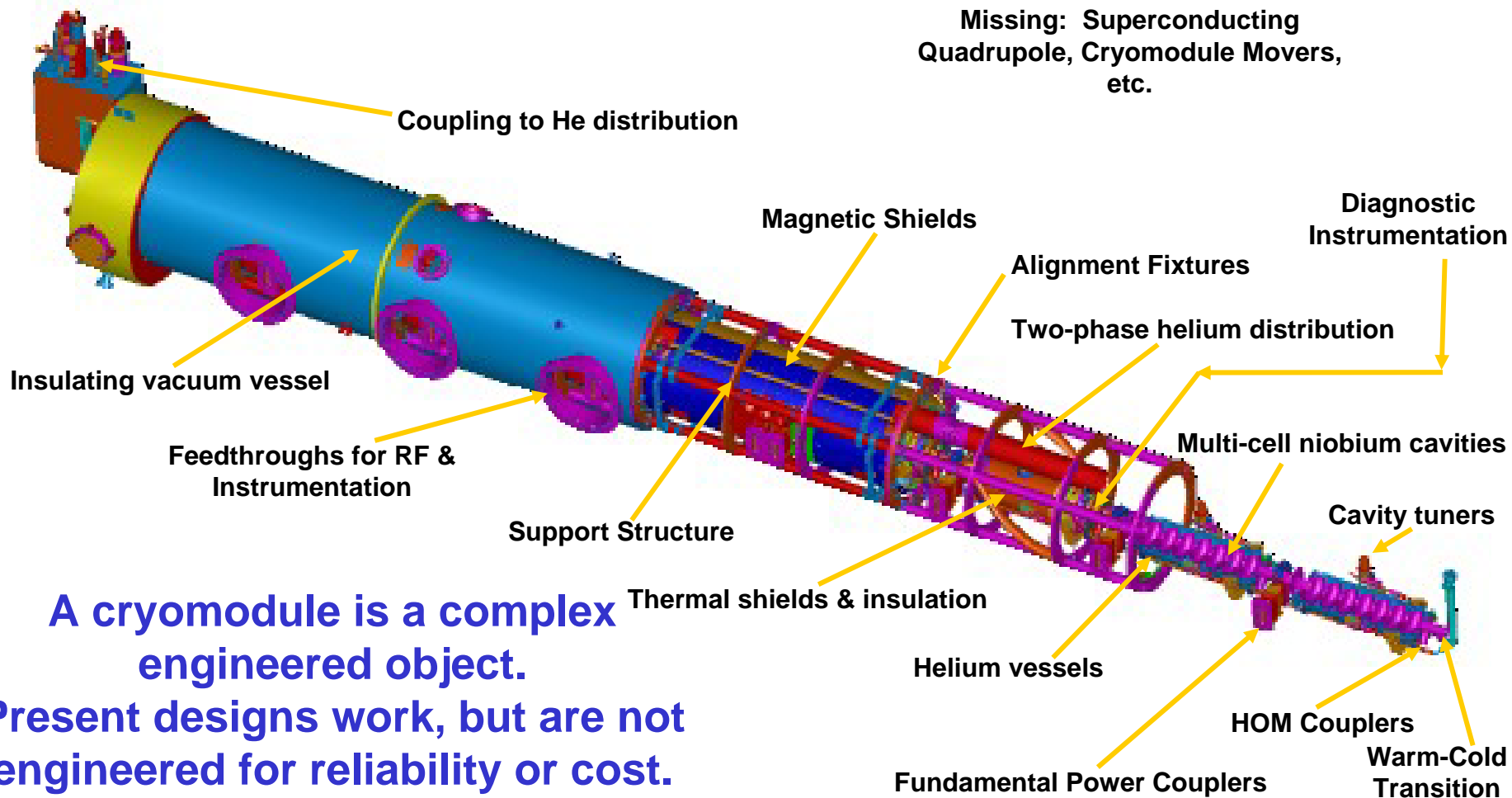


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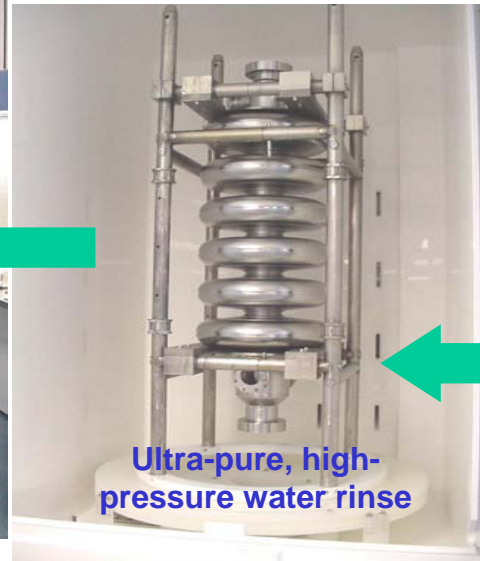
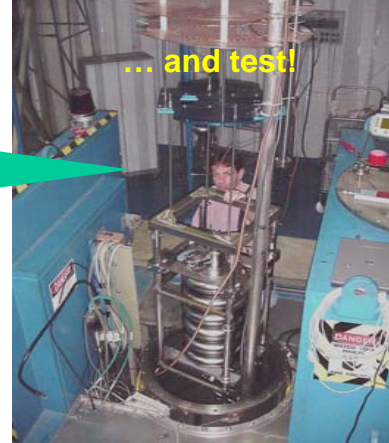
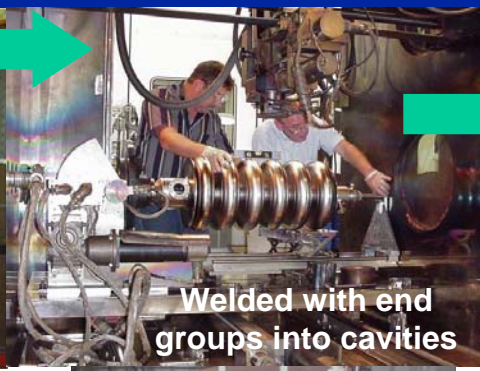
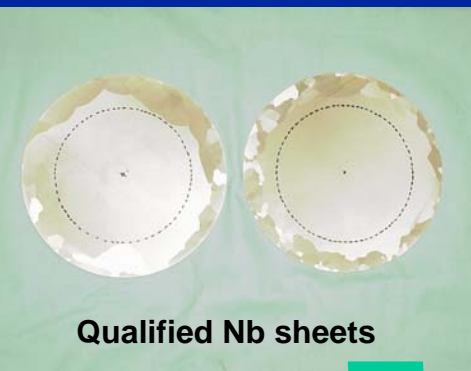
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Details vary, but ...

This model of a CEBAF Upgrade cryomodule is representative ...



Building Cavities



Building Cavities

Each of these major steps is composed of dozens of substeps – most of these have options to be investigated; all of them have quality control issues

Mike will have more details in his presentation



Building Cryomodules



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Building Cryomodules

Assembly of a cryomodule is presently a long (6+ weeks) labor-intensive activity.

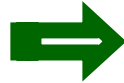
It costs about as much as assembling the cavity string and has the same impact on collider costs

We need a new design: simpler, with much more automated assembly

The Challenge

- **New model for R&D:**

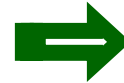
Major labs in every region
have largely duplicative
programs



Coordinate internationally to duplicate only
where it adds value, increasing total
technical reach

- **New model for design:**

Design is a national lab
responsibility



Create an international partnership among
national labs, industry and academia to
insure technical performance while
designing for cost (ease of assembly;
increased automation)

- **Would something like *Sematech* work?**

- **Time is of the essence!**

